Amendments to the Claims:

1. (Currently Amended) An optical waveguide structure, having a crossing and a branching, the waveguide structure comprising, in the area of said branching, planar waveguides comprising a waveguide material that is put into troughs formed in a substrate, said waveguide material having a refractive index higher than the material delimiting the troughs, said waveguide structure further comprising, in the area of said crossing, fibers which cross in the area of said crossings, and

wherein at least some of said fibers are at least partially inserted into said troughs, such that at least a first fiber of said fibers is at least partially inserted into said troughs, and at least a second fiber of said fibers crosses the first fiber.

2. (Original) A waveguide structure according to claim 1, wherein the waveguide structure is formed in the area between said crossings and said branchings as fibers.

3. (Original) A waveguide structure according to claim 1, wherein the waveguide material is formed as an optical polymer.

4. (Original) A waveguide structure according to claim 1, wherein the substrate is formed as an organic film material.

5. (Currently Amended) A multi-layer opto-electrical circuit board, comprising at least one layer with an optical waveguide structure having a crossing and a branching, the waveguide structure comprising, in the area of said branching, planar waveguides comprising a waveguide material that is put into troughs formed in a substrate, said waveguide material having a refractive index higher than the material delimiting the troughs, said waveguide structure further comprising, in the area of said crossing, fibers which cross in the area of said crossing, and

wherein at least some of said fibers are at least partially inserted into said troughs, such that at least a first fiber of said fibers is at least partially inserted into said troughs, and at least a second fiber of said fibers crosses the first fiber.

6. (Original) A circuit board according to claim 5, wherein the electrical layers of the circuit board are coupled via opto-electrical or electro-optical transducers to the optical waveguide structure.

7. (Currently Amended) A method for producing an optical waveguide structure, which comprises a crossing and a branching, the method comprising the steps of

- putting troughs corresponding to the course of the waveguide structure into a substrate;
- arranging fibers in a portion of the troughs; and
- placing a waveguide material in the remaining troughs, the waveguide material having a higher refractive index than the material delimiting the troughs,

wherein the fibers are arranged in the troughs in the area of the crossings in such a way that they cross in the area of the crossing, such that at least a first fiber of said fibers is at least partially inserted into said troughs, and at least a second fiber of said fibers crosses the first fiber, and that the waveguide material is put into the troughs in the area of the branching.

8. (Original) A method according to claim 7, wherein fibers are arranged in the troughs in the area between said crossing and said branching before the waveguide material is put into the troughs.

9. (Original) A method according to claim 7, wherein the substrate is formed as an organic film material, into which the troughs are hot-stamped.

10. (Original) A method according to claim 7, wherein the waveguide material is formed as an optical polymer, which is put into the troughs in a fluid state and cured by means of ultra-violet radiation.

11. (Original) A method according to claim 7, wherein the fibers are glued in the troughs.